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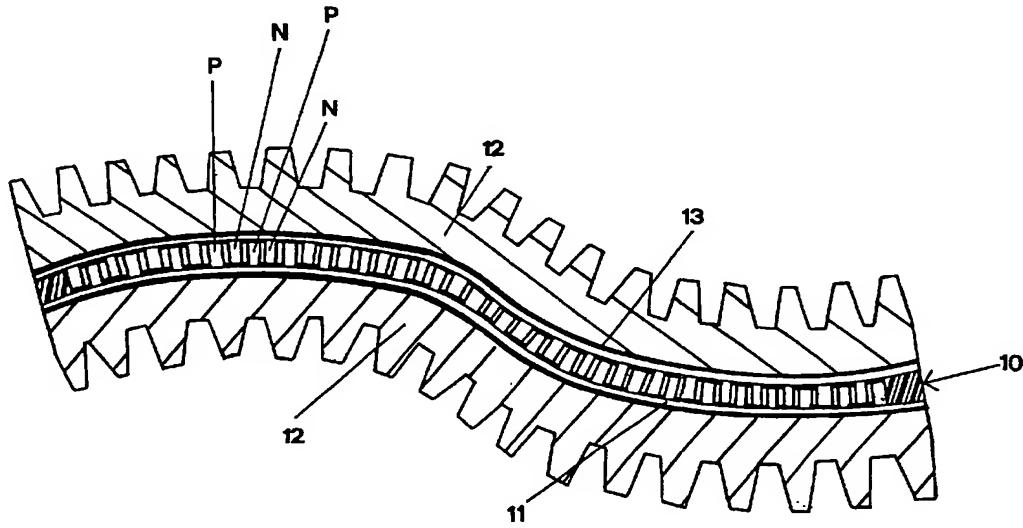
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(54) Title: INTEGRATED THERMOELECTRIC MODULE



(57) Abstract: The integrated thermoelectric module is formed of a set of thermoelectric elements, consisting of N type and P type conductor and/or semiconductor elements electrically connected in series and/or in parallel and thermally connected in parallel and being assembled on flexible supports (11) of polymeric material, capable of electrically isolating said circuit, but having a high thermal conductivity efficiency. Each support (11) is connected to a heat exchanger (12) by means of connection materials (13) having low thermal impedance allowing optimum connection even at low adhesion pressures. The thermoelectric elements are distributed in its interior part so as to geometrically harmonize heat transferred from the integrated thermoelectric module with heat exchanged by the heat exchangers, thus making the temperature distribution on said exchangers as uniform as possible.

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Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 02/13282 A (PELTECH S R L ;PICONE VINCENZO (IT)) 14 February 2002 (2002-02-14) page 7, line 10 -page 13, line 7; figures 1-10 ---	1,4-6, 8-13
A	US 6 297 441 B1 (MACRIS CHRIS) 2 October 2001 (2001-10-02) column 9, line 62 -column 10, line 25; figure 7 ---	1-4
A	US 4 734 139 A (HENDERSON DAVID R ET AL) 29 March 1988 (1988-03-29) column 3, line 31 -column 6, line 44; figures 1-11 --- -/-	1,8, 12-14

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 3 726 100 A (WIDAKOWICH M) 10 April 1973 (1973-04-10) column 4, line 4 -column 6, line 24; figures 1-7	1,8,12, 13
A	FR 1 409 754 A (DU PONT) 3 September 1965 (1965-09-03) page 2, right-hand column, last paragraph -page 7, left-hand column, paragraph 4; figures 1-11	1
A	DE 41 34 685 A (UNIV DRESDEN TECH) 22 April 1993 (1993-04-22) column 1, line 52 -column 2, line 46; figures 1,2	1
A	US 3 635 037 A (HUBERT HELMUT) 18 January 1972 (1972-01-18)	
A	US 3 302 414 A (SUDMEIER GUSTAV H) 7 February 1967 (1967-02-07)	
A	US 3 332 807 A (JAREMUS BOUBENE M ET AL) 25 July 1967 (1967-07-25)	
A	US 5 254 178 A (YAMADA KENJI ET AL) 19 October 1993 (1993-10-19)	

INTERNATIONAL SEARCH REPORT

Information on patent family members

Your Application No

PCT/IT 03/00784

Patent document cited in search report		Publication date		Patent family member(s)		Publication date
WO 0213282	A	14-02-2002	IT WO	MI20001863 A1 0213282 A1		11-02-2002 14-02-2002
US 6297441	B1	02-10-2001	US US	6686532 B1 2002069906 A1		03-02-2004 13-06-2002
US 4734139	A	29-03-1988		NONE		
US 3726100	A	10-04-1973	SE DE FR GB	329870 B 1805425 A1 1589634 A 1234947 A		26-10-1970 02-10-1969 31-03-1970 09-06-1971
FR 1409754	A	03-09-1965	BE CH GB LU NL US	647314 A 413018 A 1021486 A 45995 A1 6404737 A 3554815 A		29-10-1964 15-05-1966 02-03-1966 29-10-1964 02-11-1964 12-01-1971
DE 4134685	A	22-04-1993	DE	4134685 A1		22-04-1993
US 3635037	A	18-01-1972	DE FR	1944453 A1 2060654 A5		19-11-1970 18-06-1971
US 3302414	A	07-02-1967		NONE		
US 3332807	A	25-07-1967	GB SE US	1033311 A 306567 B 3451904 A		22-06-1966 02-12-1968 24-06-1969
US 5254178	A	19-10-1993	JP JP	3166228 B2 5063244 A		14-05-2001 12-03-1993